

**STRATEGIC ENVIRONMENTAL RESEARCH AND DEVELOPMENT PROGRAM
STATEMENT OF NEED FOR FY 05
POLLUTION PREVENTION NEW START**

HAP-FREE SOLVENTS FOR DOD HAND WIPE CLEANING APPLICATIONS

1. OBJECTIVE OF PROPOSED WORK

The objective of this Statement of Need (SON) is to develop a zero Hazardous Air Pollutant (HAP), low Volatile Organic Compound (VOC) solvent or family of solvents suitable for hand wipe cleaning operations in Department of Defense (DoD) maintenance facilities. It is anticipated that many of the most commonly used HAP solvents will be banned in the near future and that the mission capability of systems under acquisition will be impacted by the availability of low VOC/zero HAPs cleaning solvents. The DoD has a coordinated plan to address the requirement for qualified replacements for NESHAP regulated solvents that includes short-, mid- and long-term goals. The goal of this solicitation is to address long term objectives for the development of alternative cleaning materials produced from environmentally benign chemistries and not to focus on short-term process alternatives. The goal of this Statement of Need is to address industrial hand wipe cleaning applications and alternative cleaners for janitorial use are excluded. Approaches based upon the use of supercritical CO₂ are specifically excluded from this solicitation.

Proposed cleaners should be HAP-free, to insure compliance with all surface coating NESHAPs, and be effective in removing a variety of soils (e.g., water-based machine tool coolants, hydrocarbon-based machine tool lubricants, waxes, greases, oils, salts, sand, and grit). For the solvent to be implemented nation-wide in the next ten years, the maximum permissible concentration of VOC is 50 g/l, with a target VOC concentration of 25 g/l (based on California South Coast Air Quality Management District rules). The proposal must address any Environment, Safety and Occupational Health (ESOH) issues associated with the alternative chemistry. The proposed cleaning chemistry must have equal or better cleaning efficiency than current cleaners, be compatible with DoD materials (both metallic and non-metallic) whether painted or unpainted, and leave no residue which might negatively impact subsequent inspection or surface coating operations. Typical specifications for cleaners include MIL-PRF-680A, MIL-PRF-87937D and MIL-C-29602. The US Army Environmental Center maintains a web site which contains information regarding the performance validation of alternative cleaners. This site may be accessed at <http://aec.army.mil/usaec/technology/p2compliance01.html> . On this site is a report titled "Armed Services Test Protocol for Alternative Cleaner Performance Validation" which synthesizes test methods to define cleaner performance. This document may be accessed directly at <http://aec.army.mil/usaec/technology/protocol.pdf> .

Additional technical elements that must be addressed include, but are not limited to:

- Cleaners should be compatible with current cleaning processes however alternative cleaning processes will be considered.
- The proposal should provide a preliminary life cycle cost projection and describe a potential route for commercialization of the cleaner.
- Since worker acceptance is a key aspect of successful implementation, the cleaner should not have a strong or objectionable odor.
- Storage and shelf life issues should be addressed.
- Cleaners should comply with international ESOH standards and all climate change regulations: The replacement chemistry should not have a negative impact on the ability of DoD to position or maintain forces world wide.
- The cleaner should not contain ozone depleting substances.

2. EXPECTED PAYOFF OF PROPOSED WORK

The development of a HAP-free alternative cleaning chemistry will result in reduced releases of hazardous air pollutants and volatile organic compounds that result from cleaning operations in DoD depots and field maintenance facilities. It will also insure facility compliance with NESHAP regulations.

3. BACKGROUND

The pending Defense Land Systems & Miscellaneous Equipment (DLSME) NESHAP limits the use, storage and disposal of HAP containing cleaning solvents. There are also other federal, state and local laws and regulations that limit the use, storage and disposal of cleaning solvents due to their classification as hazardous, flammable, and toxic substances. The DoD Services rely on these solvents for the manufacture, remanufacture, repair, maintenance and inspection of their systems.

There have been numerous technology initiatives across the DoD to reduce dependence on VOCs and to eliminate hazardous emissions from cleaning solvents. DoD solvent surveys for CY 2001 found that hand wipe cleaning operations are still the most pervasive cleaning operation in the DoD and represent the largest quantity of VOC/HAP containing solvents used in cleaning applications. Solvent usage for 2001 at the four NAVSEA shipyards and three NAVAIR depots exceeded 454,000 pounds (281,000 lbs. for wipe cleaning) and 2002 solvent usage at fourteen Army facilities exceeded 315,000 lbs (231,000 lbs. for wipe cleaning). The solvents currently in use for hand wipe operations include; trichloroethane (TCA), trichloroethylene (TCE), glycol ethers, methylene chloride, methyl ethyl ketone (MEK), methanol, methyl isobutyl ketone (MIBK), toluene, and xylenes.

The existing NESHAPs for Aerospace and Shipbuilding regulate coatings “as-applied.” The Miscellaneous Metal Parts and Products (MMPP) and the Plastic Parts and Products (PPP) NESHAPs regulate HAP emissions from the entire coating process which includes the sub-tasks of cleaning, degreasing, paint stripping, painting, cleaning between coatings, adhesives, stenciling and marking and post painting clean-up. There are no exemptions provided and they regulate based on the quantity of solids applied.

The DoD actively participated in the development of the Shipbuilding and Aerospace NESHAPs and was satisfied with the emission limits contained in the final rules. However, no one anticipated the enormity of the record-keeping burden which this entailed until after actual implementation of these NESHAPs. Some examples of these costs include approximately \$110,000 annually for record keeping and reporting for the Shipbuilding NESHAP at Puget Sound Naval Shipyard; \$650,000 for Aerospace NESHAP record keeping, reporting and monitoring costs at Corpus Christi Army Depot; \$1,900,000 annually for total Aerospace NESHAP compliance at Naval Aviation Depot Cherry Point; and \$1,000,000 annually for total Aerospace NESHAP compliance at Hill Air Force Base. Hill Air Force Base has estimated that the MMPP NESHAP will cost an additional \$1,300,000 annually per EPA’s revised MMPP approach. If this cost is extrapolated across the 10 Air Force installations that are included in the current list of DoD major HAP sources the estimated cost is \$13 M/year just for record keeping. The Army, using the EPA Compliance Advisor Software Program, estimated their annualized compliance costs to be \$75,000,000.

There are three alternatives to address the mission risk and cost burdens associated with these NESHAPs: 1) pollution control, 2) pollution prevention and 3) the elimination of painting and bonding operations at DoD facilities. Cleaning operations are the most influential factor in compliance, and pollution prevention provides the greatest opportunity to impact this issue. In general, solvents that are suitable for wipe cleaning will also find utility in immersion cleaning, flush cleaning, and dipping/spray/vapor degreasing applications as well. The availability of a low VOC, zero HAP wipe solvent will not only reduce emissions but will also provide significant payback in terms of reduced costs associated with NESHAP mandated record keeping and reporting.

Related SERDP-Funded Projects

SERDP has a significant investment in the development of reduced VOC/HAP chemistries. Proposers are encouraged to familiarize themselves with these projects to avoid proposing duplicative efforts. Information about these projects may be found on the SERDP’s website (<http://www.serdp.org>) listed under “Research Projects”. Pollution prevention projects may be accessed directly by going to <http://www.serdp.org/research/Prevention.html>.

The U.S. Army Environmental Center (USAEC) maintains a web site which contains information regarding the performance validation of alternative cleaners. This site may be accessed at <http://aec.army.mil/usaec/technology/p2compliance01.html>. USAEC has also produced a report titled “Armed Services Test Protocol for Alternative Cleaner

Performance Validation” which establishes test methods to define cleaner performance. This document may be accessed at <http://aec.army.mil/usaec/technology/protocol.pdf>.

4. ESTIMATED COST AND DURATION OF PROPOSED WORK

The cost and time to meet the requirements of this SON are at the discretion of the proposer. The proposer should incorporate the appropriate time schedule and cost requirements to accomplish the scope of work proposed. SERDP staff will evaluate the cost and duration of the project plan in light of the scope of work proposed. SERDP projects normally run from two to four years in length and vary considerably in cost consistent with the scope of the effort. Proposers are encouraged to and may submit smaller proposals that offer technical or cost advantages that only address one or more portions of the SON.

Proposers with innovative approaches to the SON, that entail high technical risk and/or have minimal supporting data, may submit a proposal for a limited amount of funding (less than \$100,000 for a single year) to develop the data necessary to provide for risk reduction or/or proof of concept. Such proposals, if successful, may be eligible for follow-on funding.

The government reserves the right to fund more than one proposal either to meet this requirement fully or to pursue more than one innovative approach.

5. POINT OF CONTACT

Mr. Charles J. Pellerin
Program Manager for Pollution Prevention
Strategic Environmental Research and Development Program (SERDP)
901 North Stuart Street, Suite 303
Arlington, VA 22203
Phone: (703) 696-2128
FAX: (703) 696-2114
E-Mail: charles.pellerin@osd.mil